

Serial No. 09/901,746

July 22, 2003

Reply to the Office Action dated February 25, 2003

Page 2 of 9

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claim 1 (currently amended): A resonator comprising:

a multi-layer substrate having an upper and lower surface, and including at least two conductor layers which include at least two grounding conductor layers and a plurality of dielectric layers, one of the at least two grounding conductor layers being disposed on the lower surface of the multi-layer substrate;

a strip line disposed between the at least two grounding conductor layers;

a microstrip line disposed on the upper surface of said multi-layer substrate; and

a through hole formed in said dielectric layers to connect said strip line to said microstrip line; wherein

at least a portions of the one of the at least two conductor layers that is closest to said microstrip line ~~and faces the microstrip line is~~are omitted; and

one of the omitted portions is aligned with the through hole and another of the omitted portions is aligned with the microstrip line

~~said microstrip line defines a microstrip line resonator;~~

~~at least one of said plurality of dielectric layers, at least one of said at least two grounding conductor layers and said strip line define a strip line resonator; and~~

~~a single resonator is defined by said microstrip line resonator and said strip line resonator.~~

Claim 2 (currently amended): A resonator according to Claim 1, wherein said omitted portion of said ~~one of the at least two conductor layers that is omitted is~~ disposed within said multi-layer substrate and aligned with th microstrip line is

Serial No. 09/901,746

July 22, 2003

Reply to the Office Action dated February 25, 2003

Page 3 of 9

arranged such that said grounding conductor layer disposed on the lower surface of said multilayer substrate faces said microstrip line.

Claim 3 (currently amended): A resonator according to Claim 1, wherein said ~~omitted~~ portions of said one of the at least two conductor layers that is omitted defines define an openings in said one of the at least two conductor layers.

Claim 4 (currently amended): A resonator according to Claim 3, wherein said openings ~~has~~have one of a substantially rectangular shape and a substantially square shape.

Claim 5 (original): A resonator according to Claim 1, wherein said strip line has a substantially U-shaped configuration.

Claim 6 (original): A resonator according to Claim 1, wherein the resonator comprises only one said strip line.

Claim 7 (original): A resonator according to Claim 1, wherein the resonator comprises only one said microstrip line.

Claim 8 (currently amended): A resonator comprising:
a multi-layer substrate having an upper and lower surface, and including at least two conductor layers which include at least two grounding conductor layers and a plurality of dielectric layers, one of the at least two grounding conductor layers being disposed on the lower surface of the multi-layer substrate, and one of the at least two conductor layers that is closest to said microstrip line ~~and faces the microstrip line~~ has an openings formed therein;

a strip line disposed between the at least two grounding conductor layers;

Serial No. 09/901,746

July 22, 2003

Reply to the Office Action dated February 25, 2003

Page 4 of 9

a microstrip line disposed on the upper surface of said multi-layer substrate; and
a through hole formed in said dielectric layers to connect said strip line to said
microstrip line; wherein

one of the openings is aligned with the through hole and another of the openings
is aligned with the microstrip line~~said microstrip line defines a microstrip line resonator;~~

~~at least one of said plurality of dielectric layers, at least one of said at least two~~
~~grounding conductor layers and said strip line define a strip line resonator; and~~

~~a single resonator is defined by said microstrip line resonator and said strip line~~
~~resonator.~~

Claim 9 (currently amended): A resonator according to Claim 8, wherein said
opening aligned with the microstrip line is arranged such that said grounding conductor
layer disposed on the lower surface of said multi-layer substrate faces said microstrip
line.

Claim 10 (currently amended): A resonator according to Claim 8, wherein said
openings ~~has~~ have one of a substantially rectangular shape and a substantially square
shape.

Claim 11 (original): A resonator according to Claim 8, wherein said strip line has
a substantially U-shaped configuration.

Claim 12 (original): A resonator according to Claim 8, wherein the resonator
comprises only one said strip line.

Claim 13 (original): A resonator according to Claim 8, wherein the resonator
comprises only one said microstrip line.

Serial No. 09/901,746

July 22, 2003

Reply to the Office Action dated February 25, 2003

Page 5 of 9

Claim 14 (currently amended): A voltage controlled oscillator comprising:
a resonator including:

a multi-layer substrate having an upper and lower surface, and including at least two conductor layers which include at least two grounding conductor layers and a plurality of dielectric layers, one of the at least two grounding conductor layers being disposed on the lower surface of the multi-layer substrate;

a strip line disposed between the at least two grounding conductor layers;

a microstrip line disposed on the upper surface of said multi-layer substrate; and

a through hole formed in said dielectric layers to connect said strip line to said microstrip line;

wherein ~~at least a portions~~ of the one of the at least two conductor layers that is closest to said microstrip line ~~and faces the microstrip line is~~ are omitted;

one of the omitted portions is aligned with the through hole and another of omitted portions is aligned with the microstrip line ~~said microstrip line defines a microstrip line resonator;~~

~~at least one of said plurality of dielectric layers, at least one of said at least two grounding conductor layers and said strip line define a strip line resonator; and~~

~~a single resonator is defined by said microstrip line resonator and said strip line resonator; and~~

a plurality of electronic component elements disposed on the upper surface of the multi-layer substrate and arranged to define a circuit.

Claim 15 (original): The voltage controlled oscillator according to claim 14, wherein the plurality of the electronic component elements and the resonator are electrically connected to each other.

Claim 16 (currently amended): The voltage controlled oscillator according to

Serial No. 09/901,746

July 22, 2003

Reply to the Office Action dated February 25, 2003

Page 6 of 9

claim 14, wherein said omitted portion aligned with the microstrip line of said one of the at least two conductor layers that is omitted is disposed within said multi-layer substrate and is arranged such that said grounding conductor layer disposed on the lower surface of said multi-layer substrate faces said microstrip line.

Claim 17 (currently amended): The voltage controlled oscillator according to claim 14, wherein said omitted portions of said one of the at least two conductor layers that is omitted define an openings in said one of the at least two conductor layers.

Claim 18 (currently amended): The voltage controlled oscillator according to claim 17, wherein said openings has have one of a substantially rectangular shape and a substantially square shape.

Claim 19 (original): The voltage controlled oscillator according to claim 14, wherein said strip line has a substantially U-shaped configuration.

Claim 20 (original): The voltage controlled oscillator according to claim 14, wherein the voltage controlled oscillator comprises only one said strip line.

Claim 21 (original): The voltage controlled oscillator according to claim 14, wherein the voltage controlled oscillator comprises only one said microstrip line.